



GBH Communications
The Right Equation for Conferencing

Prepared For:

Arizona Prosecuting Attorneys' Advisory Council



By

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About GBH Communications (www.gbh.com)

GBH Communications provides conferencing products, services and integrated solutions to a wide variety of corporations, government and educational organizations nationwide. Enterprises small and large turn to GBH to provide solutions to their communication and conferencing needs.

As the most complete provider of conferencing and conferencing IP solutions in the business today, GBH prides itself in having a highly motivated workforce with the commitment to make a difference for our customers. GBH partners with the leading providers of conferencing products and systems to ensure that you have access to the latest state-of-the-art products and technologies. And Companies back our products and solutions with the best and most comprehensive protection and service programs available in the industry.

GBH is a trusted leader in communications solutions. We partner with companies of all sizes, drawing on a full spectrum of products and providers to craft customized solutions that maximize productivity. Our expert installation services and 24-hour TechShield support ensure that we are available to our clients every step of the way.

GBH began in 1986 when Von Bedikian, the company's founder, sold his first headsets out of the trunk of his car. Why headsets? Because of what he's come to call his reason for being: Helping people and companies become more productive. His belief is that by giving GBH the opportunity to enable communication systems within your enterprise YOUR productivity and efficiency will be stepped up to the next level.

Over the last 25 years, this privately held company is an industry leader that has grown to a \$60 million dollar a year technology consulting business. Sales continue to strengthen and customer satisfaction has never been higher. Von and his technically sophisticated staff help more and more companies every day move into smarter communications technology by working with them to find the best communications solutions for them—making them more productive and cost effective simultaneously.

TechShield Services, a division of GBH Communications, was created to ensure that companies of all sizes are able to maintain and utilize audio, video and web conferencing hardware and managed services with confidence and ease-of-use. We provide a multitude of services for conferencing endpoints including audio and video conference systems, , bridges, MCUs, gateways and desktop conferencing applications. We have partnered with manufacturers including Polycom, Lifesize, Vidyio, Tandberg, AMX, Crestron, and others to guarantee that our services are designed around their hardware and application specifications.

When we ask our customers their expectation for turnaround of a mission-critical component of their video or audio communications network, their response is nearly always, "Yesterday, but we'll settle for tomorrow." But with most service providers and warranties they end up waiting up to 30 days.

And TechShield offers much more, including the most knowledgeable technical support personnel anywhere, free connection status testing and monitoring, no-cost upgrades and product enhancements, and beyond. How do we do it? By partnering with the best-of-breed infrastructure and service providers in the industry—companies that pride themselves on delivering innovative, quality products with generous warranties for quality and reliability.

At GBH, we help solve customers' problems and provide solutions to make doing business more effective and more productive.



About Polycom (www.polycom.com)

Polycom delivers end-to-end, rich media collaborative applications for voice, video, data and the Companiesb from desktop and mobile personal systems to room systems to the network core. Polycom is the industry leader in unified collaboration solutions. Polycom 's vision is to enable people to connect anytime, anyplace and with any device in a virtual experience as natural as being there. Since its inception in 1990, Polycom has evolved to become the worldwide leader in market share for best in unified collaboration solutions that help organizations meet both productivity and cost containment challenges. Polycom is committed to preserving the environment through the solutions Companies provide, the reduced need for business travel that our products enable, and by reducing the global impact of our own operations.

Polycom delivers business value by cutting costs, simplifying system management, and fostering real time collaboration. As a result of this easier, more lifelike collaboration, people are more innovative, efficient and productive, make better decisions, enjoy enhanced relationships and greater satisfaction with their jobs -- enabling organizations to be more agile, innovative and therefore globally competitive.

Connect the most people in the highest quality at the lowest cost - with the Polycom UC Intelligent Core

Leading organizations are leveraging group collaboration solutions to improve their productivity, reduce costs, and align geographically-dispersed teams. Only Polycom delivers an infrastructure with intelligence built-in for today's enterprise – automatic failover, redundancy, adaptive resource capacity, flexible network capacity, cost-effective scalability, virtualized call management - all tightly integrated with major UC partners.

Only Polycom delivers an Intelligent Core built for Unified Communications, leading to a new era in customers benefits, including:

- Lowest **total cost of ownership** and fastest ROI - up to 50% less bandwidth utilization savings over the leading competitor
- **Dynamic resource allocation and network flexibility** providing up to 3.5 times more capacity than the leading competitor
- Only **native integration** with leading UC applications and tools for wide-scale adoption and services delivery
- Unsurpassed **quality of experience** combining Polycom UltimateHD™ with Lost Packet Recovery™ for high QoS even over the Internet

Find out more about how the Polycom UC Intelligent Core drives unmatched value to customer organizations by exploring its key elements, including the Polycom Converged Management Application (CMA), Polycom RMX Series conference platforms (4000 and 2000), Polycom Distributed Media Application (DMA), Polycom Video Border Proxy (VBP) and the Polycom Recording and Streaming Solutions (RSS, VMC).



Solution Pricing

Polycom CMA 4000 with 200 Licenses				
Qty	Description	MSRP	Customer Price	Ext Customer Price
1	Converged Management Application (CMA 4000) + 200 Devices includes Appliance, Gatekeeper, Conference Monitoring, Scheduling (Web), Device Mgmt; automatic software update , provisioning , support for CMAD. (Maintenance Contract Required)	\$21,000.00	\$13,696.00	\$13,696.00
1	Power Cord: US, Canada, Philippines	\$0.00	\$0.00	\$0.00
1	Implementation service, CMA 4000	\$9,265.00	\$8,339.00	\$8,339.00
1	TechShield CMA4000 200 License 1 year Advanced Parts Replacement Remote Support Service	\$2,999.00	\$2,347.00	\$2,347.00
1	Shipping CMA4000 Shipping-1 system	\$310.00	\$310.00	\$310.00
Hardware Subtotal -				\$24,692.00

Note: When using routed mode on CMA, concurrent call capacity is 30% of total license capacity. 200 license will deliver capacity for 60 concurrent calls.

Polycom RMX1500				
Qty	Description	MSRP	Customer Price	Ext Customer Price
1	RMX 1500 IP only 10HD1080p/20HD720p/40SD/60CIF resource configured & licensed system, equipped with one (1) MPMx-D Media Processing Module. (Maintenance Contract Required)	\$140,500	\$83,995.00	\$83,995.00
1	RMX 2000/4000 Encryption License pack - restricted by destination countries	\$0.00	\$0.00	\$0.00
1	TechShield RMX1500 20HD 720p 1 year Advanced Parts Replacement Remote Support Service	\$15,999.00	\$14,308.00	\$14,308.00
1	Implementation, RMX 1500 15HD1080p/30HD720p/60SD/90CIF System	\$6,995	\$6,296.00	\$6,296.00
1	Shipping RMX 2000, VMC 1000, MGC 25 Shipping - for 1 system.	\$620.00	\$620.00	\$620.00
Hardware Subtotal -				\$105,219.00



Firewall Traversal				
Qty	Description	MSRP	Customer Price	Ext Customer Price
1	VBP 5300-ST10 Firewall/ NAT traversal unit with H.460 support for medium to large enterprise locations. (Maintenance Contract Required)	\$12,950.00	\$8,446.00	\$8,446.00
1	Power Cord: North America	\$9.00	\$9.00	\$9.00
1	Implementation Service for VBP 5300 Series	\$3,095.00	\$2,786.00	\$2,786.00
1	TechShield VBP5300-ST10 1 year Advanced Parts Replacement Remote Support Service	\$1,599.00	\$1,424.00	\$1,424.00
Hardware Subtotal -				\$12,665.00

RSS4000 5 Ports				
Qty	Description	MSRP	Customer Price	Ext Customer Price
1	RSS 4000 5-Port Recording and Streaming Solution. 5 recording ports with content, 2 CIF or 2 SD live streams, and 100 web viewers. (Maintenance Contract Required)	\$22,500.00	\$14,674.00	\$14,674.00
1	Shipping RSS 2000 Shipping-1 system	\$310.00	\$9.00	\$9.00
1	Implementation service, RSS 4000 Series Solution	\$4,995.00	\$4,496.00	\$4,496.00
1	TechShield RSS4000 5 Port 1 year Advanced Parts Replacement Remote Support Service	\$5,499.00	\$4,847.00	\$4,847.00
Hardware Subtotal -				\$24,026.00

Pricing Note

- Quoted Prices do not include freight charges, applicable taxes, duty, VAT or freight.
- Price quote valid for 30 days from today - Pricing within this proposal is valid for 30 days from date shown. In the event the date of your approval to proceed exceeds the 30 limitation, GBH will recalculate the proposal to represent the current costs for the system.

Method and Terms of Payment

The terms of payment for this project are as follows:

- 25% of the total price due upon execution of this agreement;
- 50% Due N-30 after hardware arrival
- 25% due N-30 after Implementation sign off



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This signed agreement will serve as an acknowledgement and an agreement to these terms. Each invoice shall be due and payable to GBH, Inc., at the address set forth on the first page of this agreement. Arizona Prosecuting Attorneys' Advisory Council agrees to pay a late charge of two percent (2%) per month or the maximum lawful rate, whichever is less, for all amounts not paid within thirty (30) days of receipt of invoice.



Video Conference Room Design and Layout Recommendations

Room Requirements

The total floor space required for VC is much greater than Companies have become used to for general local presentation and meeting. In architectural terms it is not uncommon to find a rule-of-thumb applied that allows for up to 15 square feet of floor space per participant in a traditional presentation or meeting room. If there is a front-of-room presenter position at a podium, and if there is some use of in-room technology (projection devices, whiteboards, etc.), then this figure may increase to as much as 20 square feet of floor space per participant, but rarely any more than that.

It is here that Companies have our first conflict. In videoconferencing Companies have to consider not only the issues related to local viewing and hearing but also the issues of being seen and heard by people at the far-end of the connection. This means that Companies must consider sight lines and angles of participant interaction that go beyond traditional presentation environments. As a rule Companies should allow not less than 30 square feet and generally not more than 45 square feet of floor space per participant in a videoconference space. Though two to three times what Companies are used to allowing, this amount ensures that local participants will see one another and the display of local and remote electronic images. It also ensures that participants at the far-end will see and hear everyone arriving at their location via the connection, and that all will see and hear at a level of quality that does not detract and, in the best deployment, even enhances the communications.

Having determined the required size of the space, we can move on to the actual renovation or construction of the space itself. Again the requirements here are generally less forgiving than those applied in local-only meeting spaces. In the most basic sense this is because, by sheer definition, at least some of the participants in a conference-based meeting are not actually in the room. As such, customers cannot count on the typical human mechanisms (the human ears and brain and our ability to locate sound in three-dimensional space) to manage any acoustic anomalies.

If the solution is, for example, in a room that is adjacent to a double-door entry to the building, then knowing this customers can take the inevitable doorway noise into account as customers filter the sounds customers hear both inside the meeting room and coming from that adjacent entryway. Within our own physical and local environment customers have the ability to isolate local unwanted noise from local “sound of interest” (voices of other people, etc.), and place the unwanted noise in an inferior position in our conscious thought pattern. Customers are able to do this because we know where the noise is coming from and (usually) what is causing it. We may be annoyed by the noise, but we generally are able to ignore it. As soon as we add conferencing to the meeting equation, however, we add the element of electronic pickup and reproduction of all sounds. For the people at the far-end, the unwanted noise is much more difficult (if not impossible) to ignore. They do not have the ability to isolate it in three-dimensional space (the microphones eliminate the spatial reference) and they often do not know what is making the noise. The brain of the far-end participant will devote more and more conscious observation and thought energy to trying to work out these elements, in an attempt to isolate and finally “ignore” the unwanted sound. We have already stated that they cannot do this, however, due to the electronic separation between the locations. Thus they are left with an impossible task that takes up more and more thought energy, eroding the perceived quality of the spoken communication over time. Frustration and exasperation quickly set in, and the communication flow quickly falls apart.

This, then, is one reason customers must pay even greater attention to the acoustic and visual issues for any presentation space that will be connected via conference to another. Minor, seemingly insignificant anomalies we often ignore in the local environment become significant impediments to smooth communication with people at the far-end of any connection. In short, we must always ask ourselves, “What does this look like and sound like to the people at the far-end?”

Windows:

Windows usually present the equivalent of an acoustic nightmare (as well as altering the way a camera renders colors and brightness). They not only transmit room sound, but also allow unwanted outside noise to intrude on the conference space. In the event that windows cannot be avoided, it becomes essential that window treatment of some sort be used. This treatment should match the interior look and feel of the space, while providing a high level of sound and light block. Typically a heavyweight drape (24 ounces or more) of heavy fullness (not less than 6” fullness on not less than 8” centers per fold) is preferred. In all cases, the use of sheer draperies or standard vertical or horizontal blinds should be avoided, due to their inherent inefficiency in blocking sound and light, and the fine lines they create within the camera field of view.



Ceiling Tiles

These should be high-quality acoustic tiles, ideally 1”- thick compressed dense core fiberglass. An added benefit of this kind of ceiling tile is that it works well with the indirect lighting as specified elsewhere in this section. To reduce any extraneous noise from leaving or entering the room via the ceiling space, the ceiling tiles can be blanketed completely from the plenum side, with a minimum of 6”- thick unfaced dense fiberglass batting or mineral rock wool, (the equivalent of R-15 to R-19). Here again, a barrier layer will improve the performance, but all local building codes must be followed for allowable materials in the various aspects of room acoustic modifications. To make entry and exit from the ceiling space easier, the blanket and barrier do not need to rest on the ceiling tiles, but may be suspended above it.

Air Conditioning

It is critical that all air-handling equipment (blowers, heat exchangers, solenoid valves, etc.) be located outside the physical meeting room space. This will prevent the noise burden associated with such equipment from affecting the participants of any meetings held in the room. Location of air-handling equipment within the ceiling space of a conference room often renders that room unusable for video or audio-only conferencing.

The air vents should be of open construction to eliminate “wind noise” while the system is running. These vents normally are specified as “low-velocity” diffusers. The number of air vents within the room should be sufficient to maintain a consistent temperature throughout the space. All HVAC ducts and diffusers should be oversized for the general application in the space, with minimum 2’ diameter insulated flexible ducts and matching 2’ noise dampening diffusers generally best. All ducts should be installed with gradual bends and curves rather than rigid 90-degree corners. This will minimize “thunder” sounds as the initial air pushes through the ductwork and into the room.

There should be a thermostat to control this specific room system independently of the rest of the building, and that control should be located within the room.

Important: Allow an additional 5,000 BTU of cooling capacity for a standard “roll-about” single monitor VC system with extended in-room peripherals (PC, document camera, scan converter, etc.) and a minimum of 10,000 BTU for a dual display multimedia presentation system with large screen displays. For the comfort of the participants, the room must accommodate these heat loads, plus the heat load of a room full of people, with minimal temperature rise.

Interior Design and Finishes

Wall colors within the field of view of the camera have a significant impact on the far-end perception of the room video quality. Certain colors are better suited to video rooms than others. The electronics and software of the videoconferencing system “builds” the images at the far-end from a gray/blue reference image. When there is a minimal difference between the room background and the reference image color, the codec has an easier time turning the image into numbers, with the result that the far-end will see a much higher quality video presentation. In general, ***light gray with just a touch of blue seems to work best.*** PPG, or other, has a wide palette to select from; here are four options which work well: Stained Glass 447-6, Cracker Bitz 317-5, Bourbon 318-7, or Shell Flower 116-4. For rooms that have marginal lighting, slightly darker colors are quite useful.

In keeping with these color recommendations, the acoustic panels (discussed elsewhere in this section) should be ordered in light colors such as silver-gray, quartz or champagne for panels within the camera field of view. For aesthetics, however, panels may be alternated in color along the wall.

Furniture

As we have noted, VC rooms should be slightly on the large side for the typical number of attendees. The placement of furniture should present a natural rapport with the videoconference system, but shouldn’t preclude the local interaction of conference participants. Doorways used for access to the space usually should be within the view of one of the camera presets to prevent the perception from the far-end that people could come into their meeting unseen. Doorways should not, however, be in constant, direct view of the camera system, as this may cause unwanted distractions and movement of people in the picture field.

Any tables within the conference environment should have a light top surface. Glossy tops should be avoided, as should strong colors or any bold wood grain. If glossy or saturated color surfaces are unavoidable, then proper lighting can help reduce (but not necessarily eliminate) their ill effects. The best table surface color is a flat satin finish, in neutral gray. In cases where the worst possible surfaces



are present, the proper surface color effect can be achieved by using a table covering, put in place only when the room is being used for videoconferencing. This will, however, create problems related to the use of access ports in the tables or movement of end-user items across the surface.

Room Lighting

The brightness of the lighting in a videoconference room plays an important role in determining the far-end view of the meeting. When there are low to moderate amounts of light—20fc to 35fc (foot-candles), typical office lighting—the distance range of “in focus” objects (depth-of-field) usually is only 2’ or 3’ from nearest in-focus to furthest in-focus. With bright light (70fc or more) the range of in-focus objects can more than double. Participants at the far-end will see more people in sharp focus, and the codec will have an easier time encoding the image.

Bright standard direct fluorescent lighting has the undesirable side effect of being harsh for the local participants. In addition, the direct down lighting casts significant “drop shadows.” The result is undue stress among participants.

The best plan for videoconferencing is to use indirect lighting for 80 to 85 percent of the light, and evenly distributed direct lighting for the remaining 15 to 20 percent. The indirect light will help minimize shadows on the faces of the participants, and make the room more comfortable for viewing the far-end on the TV monitor. The direct light can be used to create backlight separation between foreground and background objects or surfaces.

There should be not less than 55fc and ideally as much as 75fc of light (770lux) on the faces of the participants in the facial field as viewed by the camera in the conference space. The light should be completely even across the field of measure or view, and of one consistent color temperature.

To best meet these requirements, indirect fluorescent lighting most often is recommended. This type of lighting works by using the upper walls and ceiling as diffuse reflectors for the light. The usual recommended color temperature for these is 3,000 to 3,800 degrees Kelvin. If there is a significant quantity of outdoor light entering the room, the lamps should be more than 5,500 degrees Kelvin.

Room Preparation Conclusion

When we follow the above guidelines we dramatically improve the odds for success in the final deployment of live bi-directional conference-based human communications. An added benefit is that this approach dramatically enhances the effectiveness of the room as it operates for more traditional meetings and presentations. The environment is more comfortable and flexible, and less dependent on specialized electronics for “fixing” deficiencies in the environment.



Acknowledgement

Arizona Prosecuting Attorneys' Advisory Council acknowledges having read and understood all pages of this proposal and agrees to the terms and conditions set within.

Arizona Prosecuting Attorneys' Advisory Council

Arizona Prosecuting Attorneys' Advisory Council

GBH Communications, Inc. _____.

Authorized Buyer Signature

Authorized GBH Signature

Name

Name

Title

Title

Date

Date